

SMITHSONIAN Zoogoeer

Published by **FRIENDS OF THE NATIONAL ZOO**
JULY | AUGUST | 2010

Family Farmers

Leaf-cutter
ants grow their
own food.

- » Keepers
at Work
- » Zoo
Horticulture
- » The Wonder
of Rays

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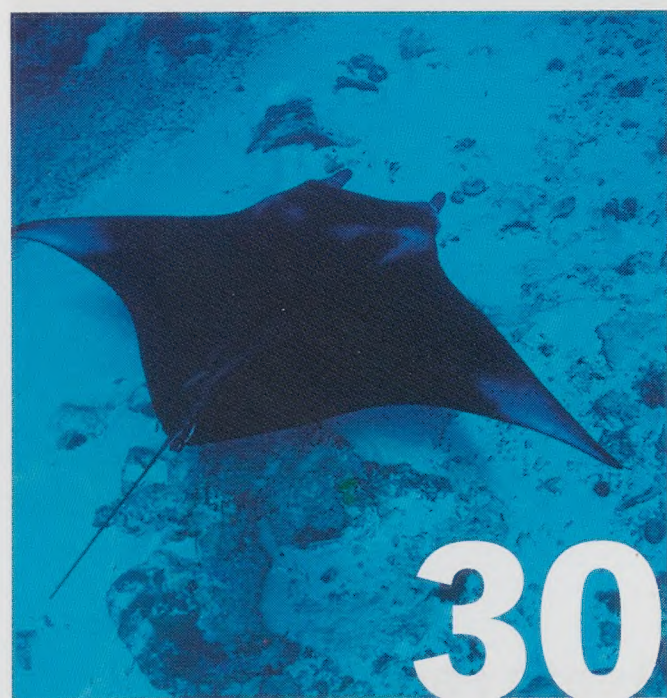
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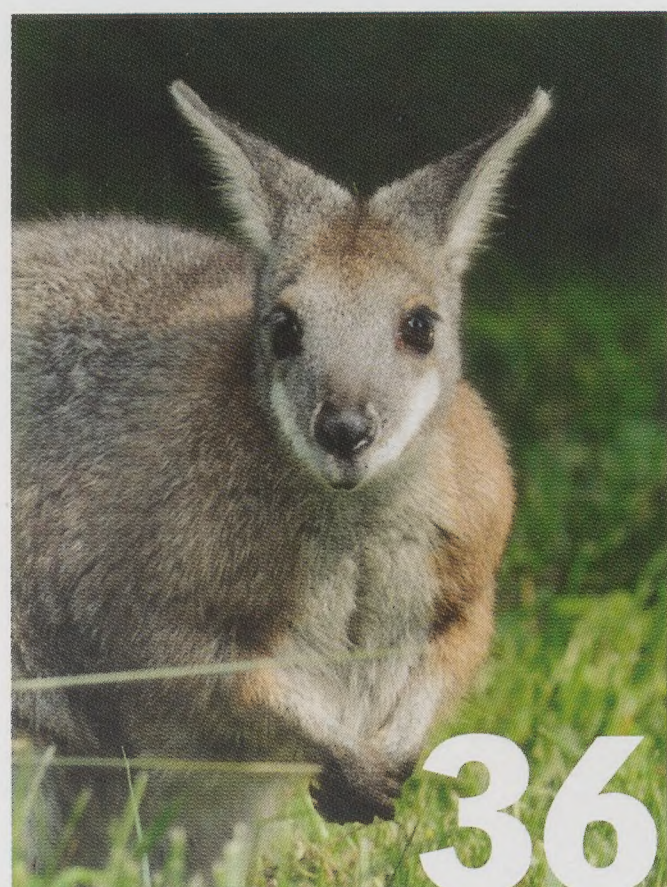
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SMITHSONIAN Zoogoer



is the dedicated partner of the Smithsonian's National Zoological Park. FONZ provides exciting and enriching experiences to connect people with wildlife. Together with the Zoo, FONZ is building a society committed to restoring an endangered natural world. Formed in 1958, FONZ was one of the first conservation organizations in the nation's capital.

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On the cover: Leaf-cutter ants in the Zoo's colony climb over a plant. PHOTO BY MEGHAN MURPHY/NZP

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SAVING A WONDER

“ARE WE HAPPY TO SUPPOSE THAT OUR GRANDCHILDREN MAY NEVER BE ABLE TO SEE AN ELEPHANT EXCEPT IN A PICTURE BOOK?”

That question, posed by renowned nature filmmaker David Attenborough, is haunting. Most of us would agree that the answer is an emphatic “No!” In that case, Attenborough urges, “people worldwide have got to say: ‘Yes, elephants are a glory and a splendor and a wonder, and we should not be responsible for their disappearance. And we are prepared to do something about it.’”

Here at the Smithsonian’s National Zoological Park, we’re more than prepared to do something: We’re actively doing it. We’re creating Elephant Trails, an extraordinary home for Asian elephants, which are perilously close to extinction in the wild. Like its inhabitants, Elephant Trails is mammoth. It’s one of the biggest projects in the Zoo’s history. When completed, it will offer our elephants a large outdoor habitat, including a hillside trek that will afford them valuable exercise opportunities. We will have room to host a small herd of these endangered animals. The herd will not only boost the population of captive elephants, but it will give scientists the opportunity to amass knowledge to help elephants survive in the wild. This will complement our efforts to study elephant conservation needs in natural habitats throughout Asia as well as our research on the health and reproduction of elephants in captivity.

Phase one of this elephantine project is drawing to a close. We’ve built a state-of-the-art elephant barn with nearly six thousand square feet of space. We’ve created two new outdoor yards and built a second pool for the water-loving elephants to enjoy. We completed the trek I mentioned earlier. And we’re finishing the Herman and Martha Gudelsky Elephant Outpost, which includes fascinating displays about these beloved creatures and stunning vistas for viewing them in their outdoor habitats. The outpost will officially open Labor Day weekend.

Phase two beckons. It will include creating a third outdoor yard and transforming our historic Elephant House into a community center in which elephants can relax and socialize as they would in the wild. You’ve probably seen the construction as you made your way along Olmsted Walk.

Big projects, of course, have big price tags. Phase one of Elephant Trails cost several million dollars, some of which came from a federal appropriation and much of which was given by generous fans of these magnificent mammals. Now comes the challenge of raising 4.4 million dollars to complete phase two. I urge you to consider supporting this historic project. You can make a donation of any size. Please visit nationalzoo.si.edu/goto/supportelephants to learn more.

When I came to the Zoo, I was awed by reports about the generosity of its friends and supporters. Now I look forward to seeing that generosity in action, as we complete a home—and a haven—for an animal that is truly “a glory and a splendor and a wonder.”

Sincerely,

Dennis Kelly

Director, Smithsonian’s National Zoological Park



MEHGAN MURPHY/NZP

SCHOOL'S IN



JESSIE COHEN/NZP

SCHOOL MAY BE OUT ELSEWHERE IN THE CITY, BUT REAL LEARNING CONTINUES HERE AT THE ZOO.

Education is a year-round endeavor, at both the Zoo's Rock Creek and Front Royal locations. It is one of the most important things that Friends of the National Zoo does in partnership with the Zoo.

This summer, some 900 children will attend our Summer Safari Day Camp at Rock Creek. Another 220 older kids will enjoy our sleepover Nature Camp at the Smithsonian Conservation Biology Institute in Front Royal. Both camps are accredited by the American Camp Association and have won its Environmental Education Award.

Twenty area teachers will take part in our first ever Teacher Boot Camp. Over six days at both Zoo campuses, participants will get a thorough grounding in the basics of science and explore engaging ways to impart what they've learned to elementary school students.

Of course, education at the Zoo is hardly limited to summer. During the 2009-2010 school year, we put on programs for 1,920 students in kindergarten through 12th grade. We also hosted workshops for 128 principals and teachers from all across the country. We expanded our outreach to schools, and lectures at Rock Creek and Front Royal drew full houses.

Putting on all these camps, classes, and events takes planning and effort. Fortunately, FONZ has abundant resources to draw on. Our education staff and our seasoned contract teachers form the backbone of our camps and classes. Just as important is the work of the 425 or so education volunteers who contributed 37,400 hours of service last year. Giving talks and tours, answering questions, and greeting visitors, they reached more than a million visitors in 2009 alone. Finally, our animal keepers and other members of the Zoo team carve time from their busy days to educate the public. I am grateful for the dedication of all these educators!

I am deeply proud of our varied and valuable educational programs. With your help, we are transforming the Smithsonian's National Zoo into a living, vibrant classroom where students of all ages encounter the marvels of nature, deepen their understanding of science, and gain a greater appreciation of the need to conserve our fragile Earth and its astonishing inhabitants. It's a message worth learning and living well.

Sincerely,

Bob Lamb

Executive Director, Friends of the National Zoo



MEHGAN MURPHY/NZP

Kiwi and Andean Bears Named

Roy Ferguson, New Zealand's ambassador to the United States, bestowed the name Hiri upon the Zoo's first female kiwi chick, which hatched on March 30. Maori for "important and great," the name is fitting for the first female chick in the Zoo's history.

Visitors to the Zoo's website voted on names for the Andean bear cubs, born in January. The female was



MEHGAN MURPHY/NZP



MEHGAN MURPHY/NZP

dubbed Chaska, a name suggested by the Embassy of Peru. Chaska means "dawn star." The male became Bernardo, a name suggested by his keepers. Bernardo

means "brave like a bear." The names were unveiled at a ceremony attended by representatives from Peru and Venezuela, where the bears live in the wild.

Zoo Welcomes Zebra Pair

Two Grevy's zebras, both two-year-old males, arrived this past spring from Busch Gardens in Tampa. They have joined the Zoo's other zebra, six-and-a-half-year-old Gumu, at the Cheetah Conservation Station. These new additions came to the Zoo following the departure of four-year-old Dante, who was sent to a South Dakota zoo earlier this year for breeding opportunities.

ANN BATTORE/NZP





Welcome Home, Francois!



MEHGAN MURPHY/NZP

The newest resident on Asia Trail is actually a Zoo veteran. Francois, a 19-year-old sloth bear, was born at the Zoo in 1991 and lived here for several years before moving to the Little Rock Zoo in Arkansas. He's the son of Merlin, the Zoo's beloved sloth bear who died last year. Francois shares his dad's humorous behaviors. "He is just as playful and seems to enjoy interacting with the keepers, just like Merlin did," says Asia Trail keeper Jilian Fazio. "He also sits Buddha-style in the same way."

Animal Care staff hope that Francois will breed with Hana, the Zoo's 15-year-old sloth bear, in order to increase and diversify the captive population. The National Zoo is also home to a third sloth bear, 10-year-old Khali. She will be Francois's companion during the non-breeding season.



MEHGAN MURPHY/NZP

Crane Chicks Hatch

Two rare white-naped crane chicks hatched in May at the Smithsonian Conservation Biology Institute in Front Royal. The chicks' mother was artificially inseminated as part of the Zoo's breeding program. "Both hatchings give a much-needed boost to the captive population of the endangered species," says Chris Crowe, bird keeper at SCBI. "The Zoo has produced more offspring than any other institution in the past eight years, and we are truly committed to advancing the species."

Scimitar-Horned Oryx Birth

Researchers at the Smithsonian Conservation Biology Institute in Front Royal welcomed a new addition to their herd of scimitar-horned oryx on April 9. The female calf, born to 3-year-old Jana and 13-year-old Dr. Bob, weighed 20 pounds at birth. She brings the total oryx population at SCBI to 16. (An additional oryx lives at the Zoo.) This birth is particularly momentous because it is the result of a Species Survival Plan recommendation.

Due to overhunting and habitat loss throughout northern Africa, scimitar-horned oryx are extinct in the wild. The National Zoo is working in conjunction with the Sahara Conservation Fund and other zoos throughout the world to gradually reintroduce the oryx into protected areas across the Sahara.



MEHGAN MURPHY/NZP

Happy Birthday, Bati!



The Zoo's only Speke's gazelle has earned a place in the record books. Bati turned 15 on May 12, making him the oldest documented Speke's gazelle living in a zoo. He celebrated in his yard near the Cheetah Conservation Station with an "herbivore's delight," consisting of herbs, grass, and other plants.

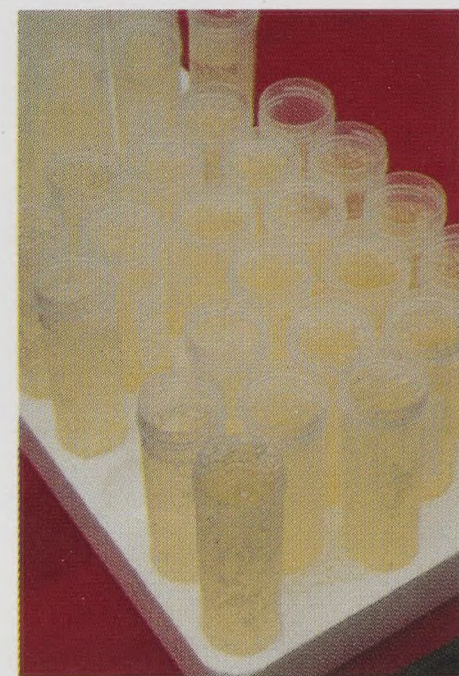
Over his years, Bati sired six calves. The only one still living is 12½-year-old Makale, who lives at the Jacksonville Zoo in Florida. Threatened by poaching and agricultural development, Speke's gazelles are endangered and usually live up to 12 years in the wild.



New Genetics Lab

With a whimsical toast—faux champagne in test tubes—and the slicing of a double-helix ribbon, the Smithsonian's National Zoo officially opened its state-of-the-art genetics lab on May 25. The gleaming facility, home to the SCBI's Center for Conservation and Evolutionary Genetics, stands on Research Hill, right next to the building housing many of our scientists. "The new lab will make it easier to interact with other researchers," says CCEG head Rob Fleischer.

The lab will also support the newest technology as it becomes available. "The enhanced ability to implement new methods is the key to answering a lot of questions we've looked forward to answering for years," says Jesus Maldonado, a Zoo research geneticist. With the Zoo already at the forefront of animal genetic research, the new lab will allow scientists to expand the scope of their research and carry it into the next generation.



Zoo Mourns Tiger and Lion Cub

Rokan, an elderly Sumatran tiger who had lived at the Zoo since 1997, was euthanized on May 28 due to a spinal cord disease that had caused lameness and coordination problems. "We knew he would get to the point when his quality of life was no longer medically manageable or acceptable," says veterinarian Katharine Hope. "Input from the veterinary team, animal keepers, and curators informs the careful decisions we must make about an elderly animal's quality of life."



Nearly 20 years old, Rokan had sired ten surviving cubs: seven males and three females. One of Rokan's offspring, four-year-old Guntur, still lives at the National Zoo.

Rokan's death came a week after the heartbreaking loss of the Zoo's first lion cub in more than two decades. Just a few days old, the male cub died of pneumonia after a sharp bit of hay lodged in one of his lungs.

Mark Your Calendar

July 15 **Brew at the Zoo**

Support conservation by sampling beer from local breweries. Learn more at www.fonz.org/brew.htm.

July 21 **Free Lecture: Keepers at Work**

Drop by the Visitor Center auditorium at 6:30 p.m. to hear Zoo keepers discuss how their work supports animal science and conservation.

July 22 **Sunset Serenades**

Our free, three-Thursdays concert series begins at 6:30 p.m. on Lion/Tiger Hill. It continues on July 29 and Aug. 5. See ad on the back cover.

Sept. 19 **Fiesta Musical**

Celebrate Hispanic Heritage Month from 11 a.m. to 5 p.m. by listening to music, watching costumed dancers, buying craft products, and enjoying Latin American food—all at our free festival.

Sept. 23 **Grapes with the Apes**

See ad on p. 35.

Reader Survey

We want to hear from you!

What do you like best about *Smithsonian Zoogoer*? What would you like us to change?

Please take our survey at

www.fonz.org/szsurvey.htm. We'll enter all respon-

dents in a drawing for a \$50 gift card for the Zoo's shops.

Interns Needed

Smithsonian Zoogoer is always on the lookout for college and graduate students willing to volunteer their time in exchange for valuable publishing experience.

Learn more at **www.fonz.org/szintern.htm**.

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FONZ'S EXCITING NEW EDUCATIONAL GAME IS IDEAL FOR CAMP AND SCHOOL GROUPS GRADES 5-12. RACE THROUGH EXHIBITS AND SOLVE CLUES TO HELP A SMITHSONIAN SCIENTIST UNLEASH THE MYSTERY OF THE PYGMY DRAGON PANDA. A STANDARDS-BASED CURRICULUM IS AVAILABLE. FIND OUT MORE AT FONZ.ORG/SAVEPDP.HTM.



HOMINID HANDLER

The National Zoo has no keepers for the most numerous mammals one sees here—human beings. The job of looking after two million visitors a year falls largely to the Guest Services staff of Friends of the National Zoo. As a supervisor in that department, Charlene Edwards oversees the informational needs of visitors and Zoo staff, ensuring that people in the park have what they need at any given time. Just as keepers dedicate themselves to the well-being of the animals they care for, Edwards and her staff are equally devoted to our guests.

Because the needs of Zoo visitors differ every day, Edwards's tasks can vary from moment to moment. Her days begin with making sure that all locations open on time and checking that all staff members are at their assigned posts. She also takes the lead on group packages to make sure that every group is greeted and enjoys its Zoo experience.

Edwards affords the same consideration to her employees. She checks on them regularly throughout the day to make sure they have all the supplies they need at their stations. Interacting with employees is one of Edwards's favorite parts of her job because of the variety of people she encounters. "It's amazing how different people are," she says. "It's wonderful being able to talk one-on-one with our teen workers and get new, fresh perspectives."

Although she's worked here since March 2000, Edwards's link to the Zoo is much older and deeper. She started visiting with her mother and grandmother as a girl and now brings her children and grandchildren. As a FONZ employee, Edwards also gets to experience a different side of the park and interact with some of her favorite animals. Highlights throughout her ten years include watching Shanthi being comforted by other elephants when she was in labor with Kandula and going behind the scenes at Lion/Tiger Hill to see her favorite animal, the tiger.

Interacting with both humans and animals is what keeps Edwards at the Zoo. Whether she's training new employees in policies and procedures, helping a guest become a FONZ member, or feeding a biscuit to Mei Xiang the panda, Edwards remains committed to promoting the best that the Zoo has to offer. For her, that means keeping everyone she encounters content during their time in the park. "Above all," she says, "our goal is unsurpassed customer service to visitors as well as our staff."

—JENNIFER ZOON AND CAROLINE JONES



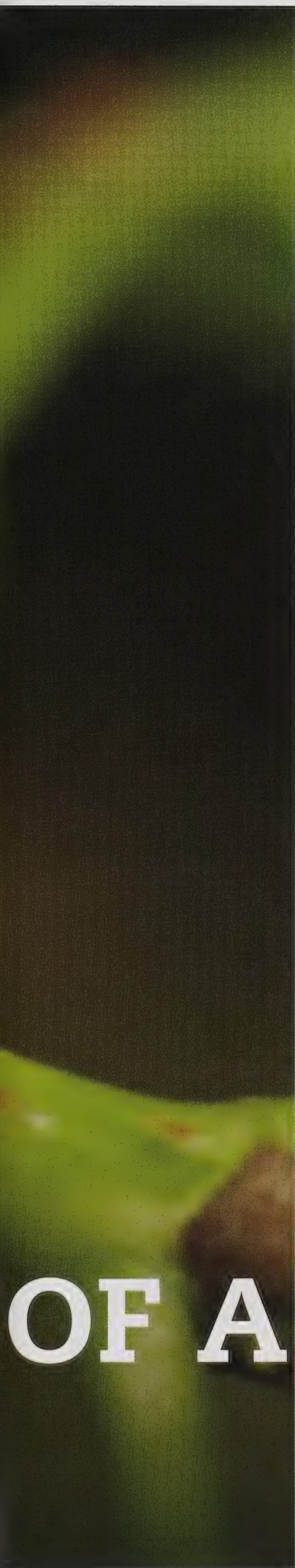
MEHGAN MURPHY/NZP

» In each issue of *Smithsonian Zoogoer*, this "How Do You Zoo?" page will showcase someone who works at the National Zoo. Learn more about careers at the Zoo by visiting the How Do You Zoo? exhibit at the Zoo's Visitor Center. Children ages five to ten can get a hands-on feel for different jobs at the Zoo. The exhibit is open most weekends from 10 a.m. to 4 p.m.



For 17 years, the Zoo's leaf-cutter ant queen has laid countless eggs. But now she's slowing down. What does that mean for her vast family?

LAST DAYS



WHEN YOU'RE LUCKY ENOUGH

to lay your eyes on the queen ant in the leaf-cutter ant colony at the Smithsonian's National Zoo, there's no doubt that she's the one responsible for the entire complex operation. First there is her astounding size. She's more than an inch in length, at least ten times larger than her smallest workers. But there's also an air about her, the result of how the smaller ants, all daughters, treat her. Ever attentive, they appear to care for her tenderly.

Perhaps they know what we at the Zoo fear these days—that without the queen, the colony of *Atta cephalotes*, which stood at a million ants in its heyday, would cease to exist. The queen is 17 now, elderly, and produces significantly fewer eggs than before. Her end may be near.

Because her offspring have a much, much shorter lifespan—between 60 and 90 days—the colony will swiftly die off once the queen dies and stops laying eggs. And whether she has mere months or years left, invertebrate keepers are preparing for the challenges and opportunities that will come with starting a colony afresh.

"I'm really grateful the queen has made it this long," says animal keeper and entomologist Donna Stockton, who has worked with this colony for eight years. "I'll be sad when she dies, but the colony has provided

so much wonderment for so many people over the years, including me. These ants are just amazing."

Ant Agriculture

A leaf-cutter ant colony starts with a single female, a queen. Yet at its peak, the colony may consist of millions of ants that each take on one of more than 22 different jobs to keep the colony running seamlessly. There are foragers, soldiers, nurses, gardeners, and even trash collectors—all female.

All those working women start out as the same sort of egg. Yet the care each young ant receives in the nursery determines the job she will be charged with for her entire life. That job will set even the ant's basic morphology. A soldier will be large, with huge mandibles; a gardener will be tiny to fit in crevices.

OF A GREAT CITY?

BY LINDSAY RENICK MAYER

MEGHAN MURPHY/NZP

LAST DAYS OF A GREAT CITY?



Ants make semicircular cuts into leaves.

MEGHAN MURPHY/NZP

Scientists are still unsure how the colony knows which types of workers are needed to keep things running. Researchers do know that the ants send out pheromones and other chemical messages to “talk.”

“We understand the pheromones and how those are sent out, but we think there’s probably more communication going on than we originally thought,” Stockton says. “Perhaps there’s a reporter ant who goes out and does a census and then tells the queen what types of workers the colony needs. But somehow the queen always knows what’s going on in every nook of the colony and is responsive to that.”

Though its members work different jobs, the whole colony hums to a single goal: sustenance. That sustenance takes the form of a fungus found only in leaf-cutter ant colonies. Growing the fungus is the ants’

livelihood. Leaf-cutter ants are the only animals, other than humans, that farm their own fresh vegetation extensively.

The process starts with small foraging ants. They carve highways the length of a few soccer fields through the floor of the rainforest. They even climb trees, creeping up into the canopy. Along the way, and under the protection of the larger soldiers, they cut bits of flowers and leaves and bring them back to the colony. An ant’s load is weighty. It’s been compared to a human’s carrying 500 pounds.

When the foragers come back with their selections, a group of smaller ants, called hoarders, analyze the findings to determine which are suitable. The hoarders reject waxy samples and anything with anti-fungal properties. Next they take the bits of usable vegetation to the smallest ants, the

gardeners. They work in a chamber about the size of a football.

The gardeners take the selected pieces and chew them up, breaking them down with an enzyme. The vegetation turns into pulp. The ants then pluck fungal hyphae, threads smaller than the diameter of a human hair. The gardeners plant the hyphae in the newly deposited leaf pulp. The hyphae feed on the pulp, growing into tasty fungus.

The ants tend their garden meticulously, pulling weeds and ensuring that no harmful pathogens destroy the crop. “Really it’s no different from you tending your own garden at home,” says Ed Smith, a biologist who worked with the Zoo’s earliest leaf-cutter ant colonies. “Successful gardening rests on successful tending. You have to obligate your time to fussing and weeding.



MEGHAN MURPHY/NZP

An ant hefts a piece of a leaf back to the colony.

EXTRAORDINARY ANTS

Ants belong to the order Hymenoptera, which also includes bees, sawflies, and wasps. It is second in diversity only to the order Coleoptera (beetles). Here are just a few examples of the extraordinary things ants can do:

Mass Attack: Army ant colonies in the American tropics range from half a million to a million animals. They attack their prey in massive “swarm raids,” tearing apart tarantulas and scorpions.

Gliding Ants: Only reproductive ants can fly, but some workers among wingless arboreal ants in the rainforest canopy have developed the ability to glide by using their long back legs as rudders.

Ant Slavery: The queen of an Amazon ant colony raids a colony of wood ants, kills the queen, and then enslaves the wood ant workers.

Herd Ants: Some ants herd aphids in order to gather their sugary secretions. Insects called leafhoppers actually let ants raise their young so they can go off and start a new brood.

LAST DAYS OF A GREAT CITY?

The weeding has to be done with tools of the appropriate size, and these ants have the perfect mandibles to do so.”

And then dinner—the bulb-shaped part of the fungus—is served. Smaller ants feed the soldiers, whose mandibles are too big for them to be able to comfortably mash up food on their own. The queen, too, is brought her meals, though she can move around the colony on her own. In part, researchers believe, the queen determines the health of her colony based on the quality of the fungus she is fed. Finally, the trash ants haul the waste to the garbage chambers, away from the rest of the colony.

Colony Creation

The fungus is also essential to the start of a new colony. Every so often, queen ants in the wild will lay eggs that grow up into queens and drones. They are the only leaf-cutter ants with wings. Seasonally, all of the new queens and drones, which are usually between half an inch to an inch in length, leave their colony and fly into the air to mate. Each queen mates with about half a dozen drones to mix genetic material broadly before returning to the ground. There she sheds her now useless wings and digs into the ground to start her own colony. She will carry that day’s sperm with her to produce eggs for the rest of her life. Yes, even for 17 years.

In addition to having a special sac to store the sperm, she has stored another essential ingredient for starting a new colony—a bit of fungus given to her by her native colony. “It’s like friendship bread,” Smith says. “But this is more than friendship; this is essential.” The queen seals herself underground with that fungus and begins to lay eggs. The fungus is so vital that, instead of feeding the scant resource to her first batch of daughters, the queen gives them eggs to eat. Later, when more workers hatch, they will break through the seal and begin foraging for leaves to feed the fungus, marking the birth of a new colony.

Again and again, that scene plays out in the Western Hemisphere. Leaf-cutter ants live in both North and South America. Their diversity—41 different species—is most notable in the tropics, where they till nearly 45 percent of the land. Leaf-cutter ants contribute to rainforest soil by composting plant material. Their pruning also keeps vegetation in check.

Unlike many other animals at the National Zoo, leaf-cutter ants are not in danger of going extinct anytime soon. Instead, they appear to be resilient. When rainforest areas are clear-cut for farmland, farmers swiftly realize that not many crops will

deter leaf-cutter ants. The ants may disappear briefly due to pesticides or forage changes, but they soon return.

Yet leaf-cutter ants are not invincible. For various reasons, foragers face a 35 percent mortality rate every time they go out into the field. One of their most prevalent predators is the phorid fly. It lands on an ant’s back and lays eggs, which hatch and eat the ant from the inside out. To deflect predators, ants climb on other ants’ backs while holding leaves in their mouths. Researchers are not sure if this is an attempt to distract the enemy or to appear fiercer.

Looking Ahead

The Smithsonian is committed to displaying these incredible insects. The Zoo has had a leaf-cutter ant colony since the Invertebrate Exhibit opened in 1987. Maintaining the colony has been a matter of trial and error. Keepers once tried to make the queen more visible by creating a separate chamber for her. This did not sit well with the ants. Determined to move the queen, they accidentally decapitated her by pulling her through a small hole.

Today, the ants inhabit a structure with multiple chambers and extensive overhead tubes. And the Invertebrates team hopes to upgrade the exhibit after the queen dies. For instance, Stockton would like the new colony to include a monitor that allows visitors to see the ants up close. She’d also love to have an open area where the ants can roam. Ants will not cross oil, so this would be a board surrounded by a moat of oil.

A new queen will cost \$1,000. The Zoo will purchase her from a colony at a university. That may seem like a high price, but the queen will be invaluable in introducing visitors to invertebrates, Stockton says. They’re fascinating animals, she argues, but they don’t always get the kind of love that the larger, cuddly mammals do.

“Many people think that ants are like little robots that are programmed to do a certain thing,” Stockton says. But visitors to the Zoo’s leaf-cutter ant colony soon learn otherwise. They discover that the ants can communicate through chemical and physical messages, such as the drumming of other ants’ abdomens on leaves. “When visitors learn,” Stockton continues, “that these tiny animals work with each other in such a way as to create this amazing colony of farmed fungus, it is hard for them to just walk away from the exhibit.” **SZ**

—LINDSAY RENICK MAYER is a public affairs specialist for the Smithsonian’s National Zoo.



MEGHAN MURPHY/NZP

Ants tend their gardens of white fungus, the insects' food.



Ant Antibiotics

Until recently, researchers believed that leaf-cutter ants kept a harmful form of mold from growing on their fungal gardens by meticulously cleaning the fungus. In 2006, however, University of Wisconsin-Madison bacteriologist Cameron Currie became the first researcher to find that the mold does, indeed, grow on the fungus.

It turns out that the ants produce an antifungal that controls the mold. By merely passing over the fungus, ants are able to keep the mold from taking over. The mold and the antifungal the ants produce evolve at the same time as part of a surprising symbiotic relationship.


The bacterium that produces the antifungal is known as *Streptomyces*. It grows on the ants' exoskeletons and is used in many medicinal antibiotics for humans.



Zoo horticulturists lovingly tend each acre of the

Where **FLORA**
Meets **FAUNA**

BY VALERIE MAY



park, feeding animals' appetites and visitors' souls.

JESSIE COHEN/NZP

Where **FLORA** Meets **FAUNA**

A butterfly garden, an eagle's perch, and wolf dens. Climbing structures for bears and a jungle gym for apes. The elegant curves of Olmsted Walk and the whimsy of a triceratops statue named Uncle Beazley. What do they all have in common?

In a word, horticulture. Each of these features, like many others, benefits from the dedicated care of the Zoo's 14-member horticulture team, headed by park manager Frank Clements. The team passionately and skillfully maintains the 163 acres of urban parkland that make up the Smithsonian's National Zoo. "And I've been on every acre," says Clements, who's been with the Zoo for 23 years.

Those 163 acres divide into two parts. Seventy-eight acres envelop the Zoo's popular attractions, home to 400 species of animals from ants to zebras. The remaining 85 acres sustain a mature forest ecosystem that surrounds the Zoo and extends into Rock Creek Park. Those woods are home to hundreds of wild animals, including white-tailed deer, Virginia opossums, raccoons, pileated woodpeckers, and black rat snakes.

In maintaining the forest, Clements says, "we try very hard to stick to native species and remove the invasive non-natives." The team uses GPS technology

to monitor the thousands of trees that are part of the forest.

The Zoo's stewardship of the land is rooted in a strong philosophical stance. "I consider the Zoo an urban forest, and our message is about conservation and preservation of species and habitat," says Chuck Fillah, whose portfolio as associate director for exhibits and park management includes the horticulture team. "We try to walk the walk, not just tell the story in the Zoo but demonstrate the experience."

Habitat, Sweet Habitat

The horticulture team plays a key role in one of the Zoo's most important challenges—creating habitats for our 2,000 animals. The team's work forms the vital backdrop for the exhibits that amaze and educate two million visitors each year.

Renovating exhibits tops the list of the department's most favored duties. It's a task that often requires planning a year in advance and that makes use of the individual talents of all of the staff one way or another. "Everybody gets excited about a renovation," says supervisory horticulturist Teresa Vetick.

"Renovation starts with a request from the curator," says exhibit designer Brian McLaren. A few years ago, the Zoo recognized the need to upgrade the maned wolves' habitat. The long-legged, 50-pound animals had gotten a bit too good at camouflaging themselves. "You could never find them," McLaren explains. "And their shelters, sort of A-frame wooden structures, weren't insulated."

Once the renovation request had been approved, McLaren began researching native habitats, with an eye toward recreating, or at least simulating, a natural environment. "We want the animals to feel

secure and at home, and we want to educate the visitors," he says, explaining that the ultimate aim is to enable the animals to display their natural behavior.

McLaren's research included identifying plants similar to those in the wolves' native habitat: open forest, savanna, and marshland in South America. He also studied the animals' dens. From there, he created concept boards illustrating various options. The relevant curator, biologist, pathologist, nutritionist, veterinarian, and keepers all weighed in on the final design.

Once approved, the "board" became a blueprint for the exhibit, and Zoo staff laid out an action plan. First the maned wolves had to be temporarily relocated to the Zoo's Front Royal campus. Then began a series of steps so highly choreographed they were reminiscent of a ballet.

Moving heavy equipment and material into the wolf yard meant going through the adjacent enclosure of the scimitar-horned oryx, a desert antelope now extinct in the wild. To minimize the disturbance to the oryx, traffic could only pass through the enclosure at set and limited times.

Under those constraints, a seven-person team led by gardener Scott Boyd spent two and a half weeks clearing the wolf yard of unwanted plants, raking out the yard, tilling the yard, raking it again, removing several dying trees, adding about 20 tons of soil, placing some 50 boulders strategically throughout the exhibit, and creating three new dens.

The dens posed something of a challenge. They had to be cave-like enough to appeal to the wolves. They also needed to be partially buried to create a warm and secure resting place for the animals. Yet keepers needed access if required. The solution: 40-inch-wide drainage tubes, five,



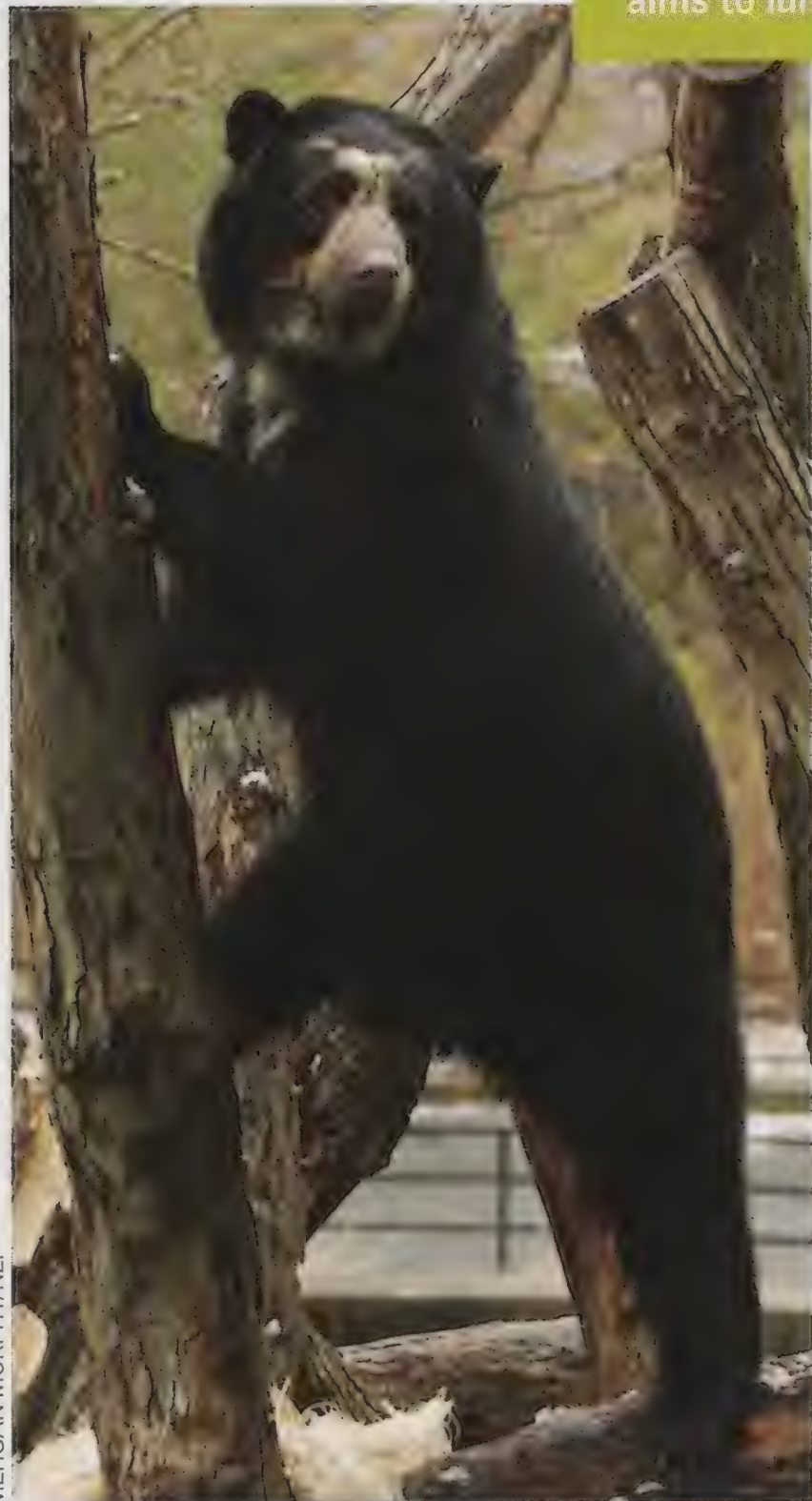
DID YOU KNOW?

The Zoo's horticulturists are the go-to team for many tasks. Last winter, for example, they orchestrated the removal of tons of snow from Zoo walkways, dumping it in parking lots. Yet there's one outdoor task the team doesn't tackle: the removal of dung from animal exhibits. That duty falls to keepers. They keep a careful eye on feces, which can offer important clues to an animal's health.



MEGHAN MURPHY/NZP

TOP: A maned wolf explores its habitat. **BOTTOM LEFT:** Billie Jean, an Andean bear, is a keen climber. **BOTTOM RIGHT:** This Zoo garden aims to lure hummingbirds.



MEGHAN MURPHY/NZP



JESSIE COHEN/NZP

An Inside Job

Zoo horticulture doesn't stop at the door. Vegetation abounds inside the Small Mammal House, Reptile Discovery Center, Amazonia, and other interior spaces. Looking after it is the duty of horticulturist Preston Burke. Daily he confronts the challenges of maintaining naturalistic environments that can withstand the enthusiasm of diggers (armadillos and rock hyraxes), chewers (tortoises and rock caviés), and shredders (meerkats). In fact, Burke describes the cute and popular meerkats as "little hellions" that "like to rip and roar."

To meet the twin needs of constructing attractive exhibits that also simulate and support habitat, Burke uses dried grasses and logs and a host of common houseplants, such as aspidistras, philodendrons, ferns, and ficuses.

For heavier animals (such as the world's largest snake, the 550-pound green anaconda) or for particularly long animals (such as the 18-foot Burmese python) Burke turns to bamboo, palms, and vines. He also deploys plenty of birds-of-paradise and bromeliads. "Many of our animals are from the South American rainforest," he explains. "Bromeliads are common there and inexpensive here."

And always the animal tales highlight the day. "I was in the Small Mammal House pruning the ficus tree," Burke recalls. "I came down off the ladder to fetch something, and when I came back, two lemurs were sitting on top of my ladder. Finally one of the keepers came and took them off. Now I use a long pole with a pair of loppers on the top."



Preston Burke

seven, and eight feet long. Each tube had an entry point for keepers. The tubes were dug into ground and camouflaged with logs and boulders.

Grasses—rye and prairie dropseed—have now grown throughout the yard, and *Erianthus* grasses will ultimately screen the holding pens in the rear. They contribute to the natural feel of the exhibit's environment. Visitors can now easily see the wolves, sometimes described as foxes on stilts with their reddish-brown coats and luxuriant manes.

"It's very cool seeing them standing on the highest point of their den or prancing through the tall grasses," says Boyd. "They obviously feel secure about their habitat." So secure, in fact, that they stayed outdoors all through last winter's blizzards—eschewing their interior enclosures to shelter in their outdoor dens.

Reuse Your Imagination

Sometimes even a small change in an exhibit can have a major effect on animals' well-being. Take the collared peccaries' yard for example. Poor drainage was making their enclosure muddy and unhealthy for the pig-like mammals, recounts exhibit designer McLaren.

"We went in and removed the top one-foot layer of compacted stone and soil, and replaced it with a sandy gravel mix. It provides better drainage, and it's much more like the southwestern [United States] habitat they are used to. Now they go out

in their area, dig holes in it, and lie around. It's a real pleasure to see them enjoying their yard."

And then there was the time when keepers noticed that the Andean bears weren't getting enough exercise. The keepers sought assistance from the horticulture department to help stimulate these elusive creatures, the only bears native to South America. In their natural cloud-forest environments, Andean bears build platforms in trees and scar trunks to mark their territories. "There was nothing in the yard that really got them moving," says McLaren. "We designed and built them a climbing structure using materials from the park. They use it a lot—especially the female and her new cubs."

Using materials from the park is a common theme for the horticulture staff. Flexing their muscle as the ultimate recycling pros, the department converts tree limbs into gorilla enrichment toys and hollow logs into garden fountains. They provide beavers with felled tree limbs for their dam building and anteaters with rotten logs for shredding. Fillah even recalls closing Rock Creek Parkway to traffic so the team could haul several huge trees to the panda enclosure for reuse as climbing structures.

Working with the nutrition team, the horticulture team recycles many of its leftovers as browse, or food, for animals. Throughout their day, gardeners watch for materials they can harvest. Elephants and apes enjoy leafy browse from hardwood trees; giant and red pandas love chomping bamboo; and beavers, gazelles, oryx, and donkeys all benefit from munching home-grown vegetation. Much of the browse for Zoo animals comes from the park. Seeing the fruits of their hard labor and active imagination put to good use by the Zoo's animals is one of the most rewarding aspects of the job, say horticulturists.

Of course, not every plant is suitable for Zoo animals. Any vegetation, from plantings to browse to enrichment structures (zoo-speak for logs, perches, and other materials the animals interact with) first gets approved by nutritionists, pathologists, veterinarians, and animal curators for toxicity to species. The Zoo has identified 39 plant species as suitable for browse. These include seven kinds

A Park Portfolio

These images by Zoo photographer Meghan Murphy offer a glimpse of the park's floral glories.



Mandevilla vine



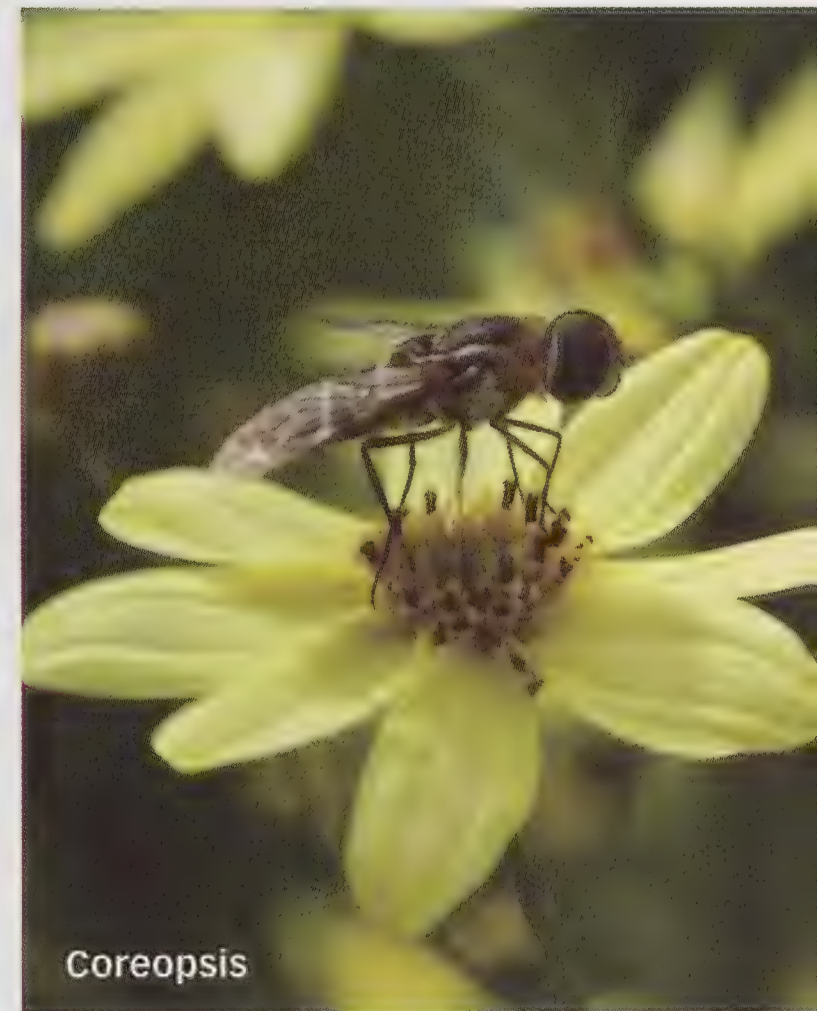
Lotus



Venus flytrap



Cape sundew



Coreopsis

of bamboo, sugar and Japanese maples, butterfly bush, redbud, birch, tulip tree, kudzu, elm, and willow.

Most of this browse is delivered to animals by keepers, but Darwin the emu has developed his own fast-food approach. He trots alongside the mower when gardener Boyd cuts the grass in his yard. "He likes to get at the grasses as soon as they hit the ground," says Boyd.

No Complaints

This year, the horticulture team is concentrating on a variety of projects: climbing structures for the apes and Andean bears, a new perch for the bald eagles, fresh seeding in the elephant yard, and rejuvenation of the plantings around the Kids' Farm and by Uncle Beazley, the life-size fiberglass triceratops across from Lemur Island.

Horticulturists plan the regular maintenance and tweaking of exhibits as carefully as possible, but the rhythms and needs of the animals ultimately shape every decision. This past spring, for instance, the Zoo went into high alert over the possible

pregnancy of female panda Mei Xiang. Staff kept her under constant watch.

"With the recent hopeful news, we weren't allowed in there for some weeks," says Boyd. As a result, the grasses in the enclosure grew unusually high, giving horticulturists some extra work. Once it became clear that Mei Xiang was not pregnant, gardeners were allowed back into her enclosure. They cleaned out the debris branches, cut the grasses, raked out the grass, and pruned.

There's another species that creates extra work for the horticulture team: *Homo sapiens*. "The toughest thing on our plants is the public," says McLaren. "The happy visitor free-for-all at the Zoo is hard on plant matter." So the gardeners plant thick masses of flowers along the walkways, an aesthetically pleasing way of saying, "Don't tread on me."

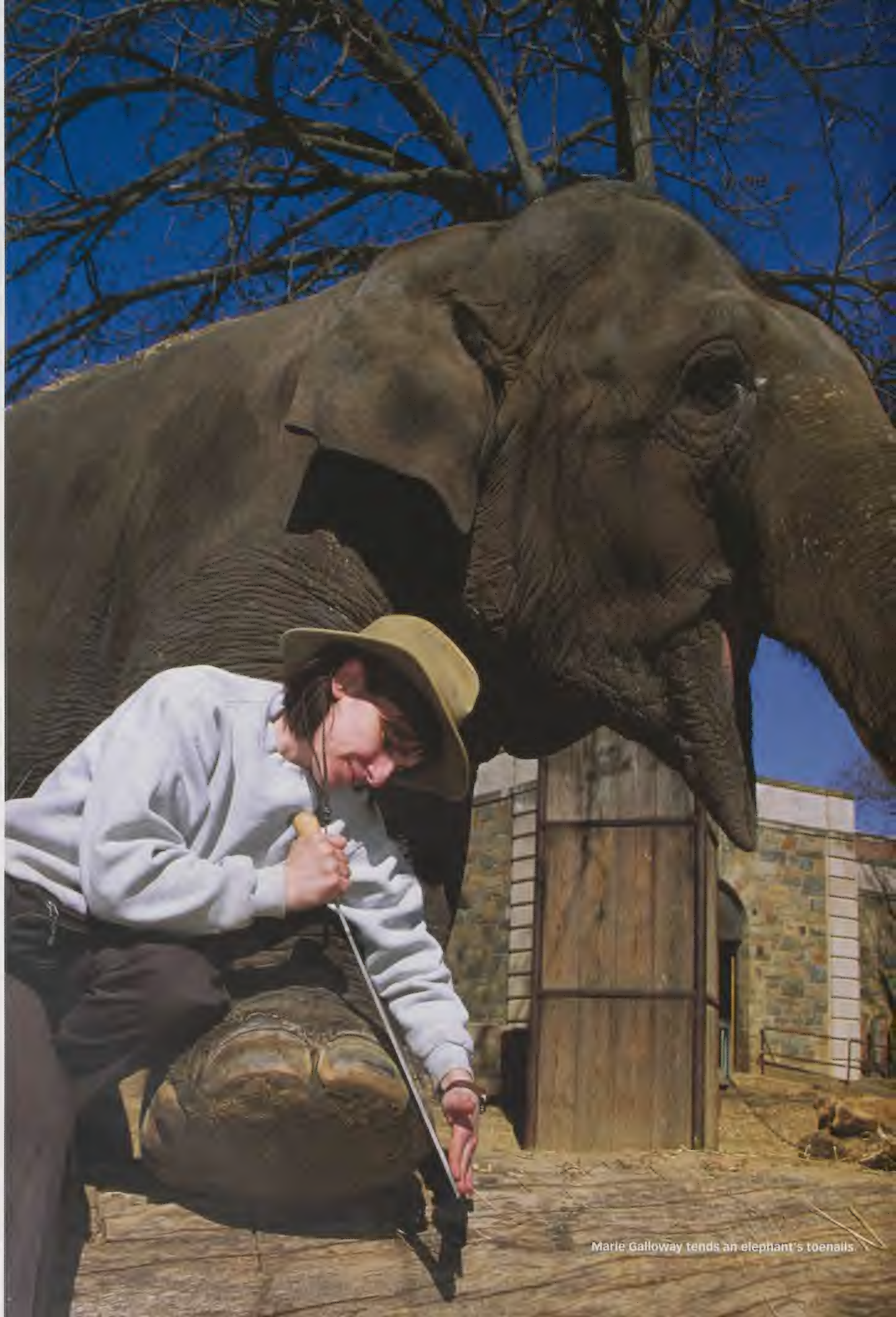
Landscaping around the twin lions that flank the Zoo's Connecticut Avenue entrance poses special challenges. Visitors seeking that special photo opportunity have a penchant for climbing the statues—causing the park's safety staff to cringe. The

gardeners' solution has been to plant dense, prickly *Osmanthus* shrubs around the base. Nonetheless, they have still had to replace the shrubs several times within the last year.

Yet no one's complaining. The Zoo's horticulturists tell their stories affectionately, and they clearly love their jobs. "You think you've seen it all, and then tomorrow brings another surprise," says Preston Burke, who's in charge of all interior exhibits. "The coolest thing," adds crew leader Craig Rudolph, "is being able to work outside. I have the best view from my office every day."

That view ranges from exhibits to forest, from humble planting and pruning to major renovations. It's all part of the varied and valuable work of the horticulture team. "Any plant living, or at one time alive," says McLaren, "I consider Zoo horticulture." **SZ**

—Freelance writer and web producer
VALERIE MAY covered the challenges of animal transport in the March–April 2010 issue of Smithsonian Zoogoer.



Marie Galloway tends an elephant's toenails.

What does a zoo keeper do?
Find out by joining two of our dedicated keepers on the job.

WILD

workdays

BY GABY GOLLUB

As a child, Gwen Cooper couldn't stop bringing home stray cats and dogs, caring for injured birds, and catching insects. So it wasn't a big surprise when, years later, career assessment tests indicated that she should work with plants or animals. Her mother had encouraged her to enroll in a program aimed at getting single mothers back into the workforce, and Cooper excelled at her classes.

When it came time to find an internship, she began working at the Smithsonian's National Zoo as a volunteer keeper aide. A temporary keeper position at the Zoo's Bird House opened up in 1991. Thanks to her year of volunteering, she had the required experience. A year after that, she secured a permanent position and has been a Bird House keeper ever since.

Cooper is one of about 90 keepers caring for the 2,000 animals at the Zoo's Washington, D.C., and Front Royal, Virginia, campuses. Keepers work with everything from anacondas to zebras. They clean, prepare food, educate visitors, conduct research, enrich the lives of the animals in their charge, and do much more.

Keepers have a wide variety of backgrounds and experience. One Kids' Farm keeper began her tenure here as a videographer. An Amazonia keeper has cared for Zoo animals for 30 years. Eight others have been here more than 20 years. Many have a bachelor's or master's degree in biology, zoology, or a related science, while others have degrees in something else or didn't finish college. Some served as volunteer keeper aides and behavior watchers through Friends of the National Zoo. Many have worked at other zoos. Despite their differences, one thing they all share is a commitment to providing the highest quality care for the Zoo's animals.



Gwen Cooper with flamingos

Knowing Your Animals

It's early on a Tuesday morning, and Cooper is unlocking the door of the Outdoor Flight Cage, the Zoo's large aviary. An Indian peacock displays his stunning tail feathers to the females nearby. This area is part of Cooper's "line," the animals and exhibits for which a keeper is responsible.

The hooded mergansers and smews are in the lower pool and seem to be waiting for Cooper. "I'd like to think they know me, but I think they just know food." She looks at each of the ducks—their eyes,

of thawed crickets, many of which are moving around.

The food had arrived in tubs earlier that morning from the commissary. Keepers in the Zoo's nutrition department prepare diets for animals throughout the Zoo to meet their widely varying nutritional needs. They measure the pellets, mealworms, biscuits, and meat; count mice; set aside the proper number of whole fruits and vegetables and cans of food. In each exhibit's kitchen, keepers—and sometimes volunteer keeper aides—chop the carrots, quarter the apples, open the cans, form meatballs, mix in

20 minutes of sweeping and glass cleaning, while another may take hours. Some need fresh branches arranged just so. Elsewhere, a pool must be drained, cleaned, and refilled. Making the exhibits beautiful for the public is just one of the results. A clean home for the animals—and one with a new array of branches—is part of the formula for high-quality animal care.

After Cooper checks and feeds the rest of the birds in the enclosure and makes sure there are no electrical or water issues, she heads over to the greater rhea shed with keeper Ric Pinto. It's raining, but their work must go on, snow or sunshine, 365 days a year. She encourages the five-foot-eight male bird to stand up and coaxes him to a door, so she can handle one of the five eggs he's incubating without his getting upset. Well, seven if you count the two dummy eggs used to persuade the female the clutch is big enough and she can stop laying, and to help the male better distribute his weight. She then candles the egg—holding it up to a device that shines a bright light into the egg. Candling should reveal the air sac and growing embryo. She can't get a good look today. Another day, though, Zoo staff used the device to find a vein from which they extracted blood, analyzed the DNA, and learned that the embryo is female. The chick will be sent to another zoo, which requested a female.

While Cooper is busy with rhea eggs, other Bird House keepers conduct observations on the double-wattled cassowaries and kori bustards to collect information on their typical behavior in a zoo. Three times a day for five minutes, they record the birds' activities every minute on a chart called an ethogram. National Zoo data will be combined with those from a few other zoos conducting the same observations on their cassowaries and koris. As a result, the community of keepers will have a greater understanding of their birds and be able to provide even better care. This is just one of many examples of research undertaken by keepers.

Being a keeper "is the dream job," Cooper says. She gets to make sure all the birds on her line are taken care of as best she can, just as she did as a child.

"I pride myself on knowing the personalities of the birds," Cooper says.

feathers, relative locations, and behavior. Location can indicate ill health for flock birds, she explains. If 60 of the Zoo's flamingos are standing close together, and one has separated itself by several feet, something could be wrong. This morning, everyone appears normal and healthy.

Cooper reaches into a bag of game-bird pellets and tosses a dozen handfuls into the pool. She watches the birds pursue them. If a bird is uninterested in eating, she will note that in the keeper report she writes daily. A more serious concern will prompt her to talk to her supervisor and determine whether they should call a vet. Having worked with the Zoo's bird collection for so many years, she has come to learn typical behaviors and markers of illness for dozens of species. "I pride myself on knowing the personalities of the birds," she says.

Cooper turns around and sees the teals in the same area where they usually are. Because they're territorial, it's easy for her to find them every day and see how they look. She sprinkles food into a second pool. Three of the peafowl and a few mountain bamboo partridges are walking around, so she counts and inspects them. Then she scatters pellets mixed with chopped vegetables. She does this—rather than dumping them into a dish—so the birds have to forage, an activity that serves as enrichment. She also throws handfuls

medication as needed, and distribute food for each enclosure. They do this every day, sometimes twice a day.

Cleaning and Candling

A new vet tech named Sara Meadows walks into the aviary. The vet techs are rotating throughout the Zoo's exhibits, pitching in four days a month in each area, to get to know the animals and the keepers. Cooper starts instructing her how to clean the poop off the rocks and railing with a high-pressure hose. Training staff is all in a day's work for Cooper. She recently began coordinating volunteers from local schools to give them a meaningful experience and maybe even get them started in the field. "I love mentoring people," she says.

Cleaning times vary throughout the Zoo. One enclosure may need only

DID YOU KNOW?

July 18-24 is **National Zoo Keeper Week**. Organized by the American Association of Zoo Keepers, the celebration honors the nation's 6,000 animal-care professionals.

Today's Menu

Each day, keepers at the Zoo and the Smithsonian Conservation Biology Institute serve up an enormous amount of food. Here are a few highlights.

- 275 pounds of produce
- 500 pounds of dry commercial feeds
- 1,800 pounds of hay
- 90 pounds of carnivore diet
- 60 pounds of fish
- 25,000 mealworms
- 920 waxworms
- 11,000 crickets
- 500 rodents

MEGHAN MURPHY/NZP



Malia Somerville feeds gray seals.



Jenny Spotten and Craig Saffoe discuss sloth bears.

Enriching Animals' Lives

"These are probably the most interesting animals at the Zoo," says Kenton Kerns. He is not talking about giant pandas but about the naked mole-rats that live in a colony in the Small Mammal House, where he has been a keeper since 2007. Kerns is giving a behind-the-scenes tour of the exhibit to a small group, and his audience listens intently while he gives a dozen examples of how exceptional the species is.

Unique among mammals, these pink, wrinkly animals are ectothermic ("cold-blooded") and immune to cancer. Their breeding queen keeps growing throughout her life, which can be more than 28 years. She can have the biggest litter—up to 28 pups—of any mammal.

The mole-rats are not really naked. They have a few fine hairs on their feet and around—and inside—their mouths. "It's disgusting but it's awesome," Kerns says.

"The best part about being a zoo keeper is working with animals, and that's the very core of the job," Kerns says.

And one more fact about their mouths: A quarter of these rodents' musculature is dedicated to closing their jaws—the same proportion as in each of our legs.

Naked mole-rats are particular about their burrows. Each day, Kerns says, a keeper removes all of the shavings in the colony's enclosure and replaces them with fresh ones. Then the mole-rats move them around the chambers just where they want them—few in the "pantry," where the sweet potato and other food is stored, and more in the "bathroom" chamber.

Kerns has already told the group all about the greater Madagascar hedgehog tenrec, which looks like a "sleeping Brillo pad" while in torpor, a state similar to hibernation but with a weekly period of consciousness to eat and urinate. And the group has met a three-banded armadillo and a prehensile-tailed porcupine that was hand-reared by a team of Zoo keepers.

Kerns says his good-byes and moves on to a training session with Waddles, a



Kenton Kerns holds a tenrec.

prairie dog. Kerns hopes that Waddles will one day be comfortable with being removed from his exhibit and spending a few minutes in a plastic demonstration box during a tour. It has taken Kerns and another keeper a month to get Waddles to enter a box on the floor of his exhibit and remain there while he eats his leaf-eater biscuit reward. At first, Waddles would become agitated when the box door was closed (prompting keepers to open it back up), but he now remains calm.

Training animals to enter crates so they can be relocated, step on scales, come inside, lie down for ultrasounds, present their paws, and—for some—be handled is a major part of a keeper's job. When animals are trained, staff can better monitor their health and care for them. Before an Andean bear gave birth to twins in January, she allowed staff to conduct an ultrasound and confirm she was pregnant. The bear team was then able to estimate her due date and be prepared for cubs.

Keepers can always use more time to train and create enrichment for their animals. Staff schedules vary. Some days there are two keepers and a volunteer aide taking care of a line, while on other days, a keeper may work alone. The keepers, many of whom once were keeper aides, appreciate the help they get from volunteers.

"By helping out with the day-to-day duties," great ape keeper Amanda Bania says, "they free up time for keepers to do more enrichment, research, and training, all of which are directly related to improving animal welfare, which is my top priority." Volunteers contribute more than assistance. "They have enriched my life by bringing more joy and friendship into my workplace," says Small Mammal House keeper Rebecca Smithson.

Enrichment, in fact, is an essential part of what keepers do. It can mean hanging half a banana from a branch for the golden lion tamarins; providing the spiny lobsters with unopened clam shells; putting honey, apples, and leaf-eater biscuits inside a toy for the giant pandas; giving the Sumatran tigers a durable plastic ball to attack; or leaving scent trails in a cobra enclosure to encourage investigation. Working with the Zoo's enrichment and training curator, keepers are constantly developing and modifying enrichment ideas to help animals lead more fulfilling and natural lives.

Taking Pride in the Job

While keepers at the Zoo form their own community, they are also part of the larger Zoo staff as well as the community of keepers throughout the country. So they seek out opportunities to contribute to the Zoo and their colleagues. Some are members of the Zoo's Green Team, which works to champion and implement sustainable practices at the Zoo. Others run the local chapter of the American Association of Zoo Keepers, dedicated to high-quality animal husbandry and supporting professional development.

To keep improving animal care at the Zoo, keepers attend courses and conferences, pursue advanced degrees, and travel to other zoos to learn from—and educate—their counterparts. In February,

Pinto traveled to Mexico's Africam Safari with two kori bustards and the Zoo's acting curator of birds to help launch what could be a major breeding program. In the fall, Kerns will begin a master's program in zoo and aquarium leadership.

"The best part about being a zoo keeper is working with animals, and that's the very core of the job," Kerns says. "However, there are two more aspects of zoo keeping that truly give you a sense of pride. The first is the knowledge that we are part of a larger conservation organization that is working to help these species in the wild and conserve their habitats.

"The second is that we're always striving to teach the public about our animals: through classes, lectures, demonstrations, our volunteers, and even random conversations we strike up while walking through the Zoo. Introducing a child to her first endangered animal or watching a group of teenagers understand their direct impact on a threatened primate in Brazil—that fills you with pride." **SZ**

—GABY GOLLUB *is the senior online editor for Friends of the National Zoo.*



Linda Moore and veterinarian Luis Padilla tend a bald eagle.

JESSIE COHEN/NZP



Nicole MacCorkle trains a panda.

MEHGAN MURPHY/NZP



**YOUR
NAME
HERE**

No, we are not actually going to put your name on an elephant! But by donating to Elephant Trails, you'll receive the next best thing. Contribute \$250 or more and have a 4"x 8" brick—with your name on it—installed into the foundation of the ground-breaking Elephant Trails exhibit. Elephant Trails: A Campaign to Save Asian Elephants is a comprehensive breeding, education, and scientific research program designed to help scientists care for elephants in zoos and save them in the wild. The cornerstone of this effort is a new, expanded home for elephants at the Zoo. The first phase of it opens later this summer. If you want to go really big, life-size elephant footprints are also available for larger donations. Donate at www.fonz.org/bricks.htm and leave your mark on the Smithsonian's National Zoo today!

All bricks will be installed in the finished Elephant Trails exhibit area. Exhibit completion estimated 2013.

MEHGAN MURPHY/NZP



DID YOU KNOW?

Anteaters Eat More Than Ants

Giant anteaters (*Myrmecophaga tridactyla*) in the wild gobble termites as well as ants. They also feast on both ant and termite eggs. And if they happen to come across ripe fruit that's fallen to the ground or the eggs of a ground-nesting bird, it's snack time.

Anteaters at the Zoo primarily eat a nutritionally complete insectivore

chow that's rich in protein and fiber. It looks a lot like Grape-Nuts, says keeper Marie Magnuson. She reports that Dante, the male, takes his chow however it comes, while Maripi, the female, likes hers ground up and mixed with water.

Keepers vary the anteaters' menus with crickets, mealworms, fruit, hard-boiled eggs, Jell-O, and peanut butter (which only Maripi likes). They also put rotting logs in the enclosure, so the animals can hunt for ants, termites, and eggs.

ANUP SHAH/NATUREPL.COM

FACT OR FICTION?
Chameleons Change Color to Blend in With Their Surroundings

FACT. Some chameleons do change color for camouflage, says reptiles curator Jim Murphy. This ability is especially striking in Africa's flap-necked chameleon (*Chamaeleo dilepis*), seen here. Costume changes help the lizards avoid detection by predators, as does chameleons' habit of pressing their bodies close to branches.

Yet camouflage, Murphy explains, is only one reason that chameleons change color. The other is communication. Color changes can signify, for example, that a chameleon is irked by an intruder's presence in its territory or eager to woo a mate.

You can see a veiled chameleon (*Chamaeleo calyptratus*) in the Zoo's Reptile Discovery Center.

BRIAN GRATWICKE



Where in the Zoo?

This neon skin is the opposite of camouflage. How does it help its owner survive? Find the answer at nationalzoo.si.edu/goto/whereinthezoo.

SUPERLATIVE
Smallest of Our Small Mammals

The Zoo's Small Mammal House hosts an ark's worth of fascinating little critters: prickly porcupines, armored armadillos, a fierce ferret, and more. Yet the smallest of them all are the naked mole-rats (*Heterocephalus glaber*). Each of these mini mammals weighs just an ounce or two. Their bodies are about three inches long. These rodents are native to East Africa.

Size isn't all that distinguishes naked mole-rats from their fellow mammals. There's the animals' near hairlessness, for one thing. Living in tunnels where temperature and humidity are fairly constant, mole-rats don't need hair for warmth or protection from the elements. Should the temperature drop, the rodents simply huddle together for heat. Baldness means these wee weirdos needn't expend energy growing hair. It also lessens their vulnerability to parasites.

Then there's the mole-rats' unique social structure. They are eusocial, which is a posh way of saying that they live in insect-like colonies. A mole-rat colony may boast 20 to 300 members, only one of whom—the queen—gives birth. Just a few privileged males get to breed with her. The rest of the mole-rats are either workers or soldiers. Workers search for food—tubers in the wild, a mixed vegetarian diet at the Zoo—and build nests for the queen. Soldiers, who are a bit larger, clear dirt from the tunnels and defend the colony against predators.

You can tune into our naked mole-rat colony by following the Live Cams link at nationalzoo.si.edu.

MEHGAN MURPHY/NZP



HIP HIP FOR RAYS!

BY PAMELA
BUCKLINGER

Cousins of sharks, these fish are flat and fabulous.

FLAT FISH » Rays are flat fish that are closely related to sharks. There are about 500 different species of rays, and they live all over the world. Unlike other fish, rays and sharks have skeletons made of cartilage. That's a strong substance that is softer than bone. (Your outer ears are made of cartilage.) Rays can be as small as a pancake or as big as a truck, though most rays are in between these sizes. Their eyes are on top of their heads, but their mouth and gill slits are on the underside of their bodies. Rays like to hang out at the bottom of the water in which they live.

WHAT'S FOR DINNER? » Rays eat fish as well as small plants and animals. Most find their meal at or near the bottom. But manta rays do something different. They are filter feeders. That means

they swim with their mouths open, taking in mouthfuls of water. It flows over filters, which catch tiny plants and animals living in the water. Other rays are active hunters. They look for a yummy snack, grab it, crush it with their teeth, and swallow it. Some rays have big lip-like flaps that make the animals look like swimming vacuum cleaners sucking up the ocean floor. The electric ray has a shocking way to get its food. It can produce enough electricity to stun a five-pound fish.

GOING MY RAY? » Rays swim very differently from other fish. They "fly" through the water by flapping their powerful, wing-like bodies up and down. Some rays can even jump above the water. Many rays are coated with slimy stuff that helps

BY THE RAY...

- Manta rays can stretch 20 feet across and weigh more than 3,000 pounds.
- Some rays can go as deep as five miles below the surface.
- Ray mothers produce a milk-like substance to feed developing babies.
- Manta rays have "horns" on their heads and are sometimes called devilfish.
- Ancient Romans believed that a headache could be cured if you placed a live electric ray on the spot that was in pain.
- A sawfish is a kind of ray. It has a body like a shark but a nose that looks like a saw.

them glide faster. Like some sharks, rays sink down to the sea bed when they stop swimming.

THE TAIL END » All rays have tails, which range from a few inches to ten feet long. Most rays have hard, pointy spines on top of their tails. Rays use the spines to protect themselves. Some rays have whip-like tails that can cut enemies. Others poison their foes. Although some rays can bite, they don't use their teeth to protect themselves. Rays don't normally attack people. Most injuries occur when someone accidentally steps on a ray, and the animal tries to protect itself.

AT THE ZOO » Swim over to Amazonia to see river stingrays, which live in fresh water.

Calling All Kids!

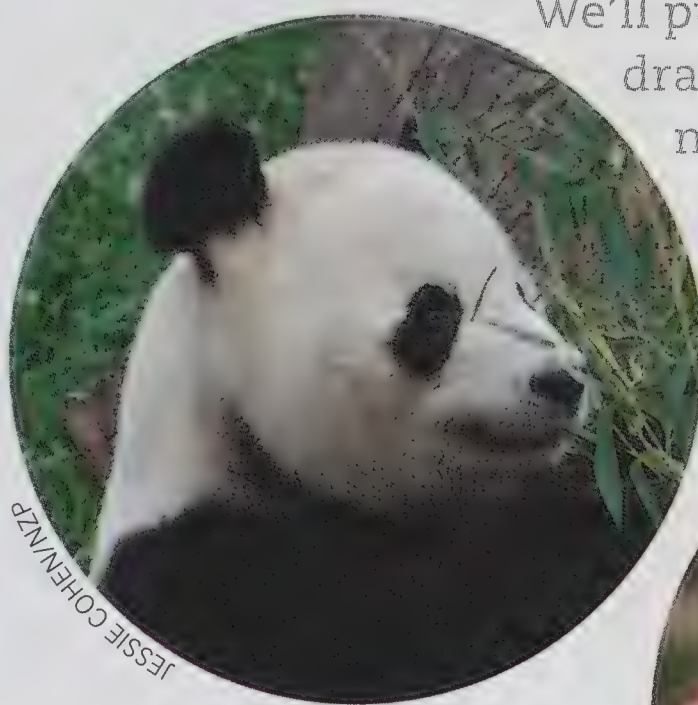
Smithsonian Zoogoer wants to hear from you.

Tell us about your favorite animal.

What is it? Why do you like it? Send your letters and pictures to Zoogoer@si.edu or mail them to the address below.

Smithsonian Zoogoer
Friends of the National Zoo
P.O. Box 37012, MRC 5516
Washington, D.C. 20013-7012

We'll publish a selection of your writings and drawings in future issues. Please include a note from a parent or guardian (giving us permission to print your work) and let us know how old you are.



JESSIE COHEN/NZP



MEGHAN MURPHY/NZP

BUBBLE BONANZA

Some fish make bubbles, and you can too. Make your own bubble mix by blending the following ingredients. If you don't have a wand handy, you can bend a pipe cleaner to make one.

- 1 cup water
- ½ cup non-toxic dish detergent
- 2 tablespoons corn syrup
- washable, watercolor paint



JESSIE COHEN/NZP



BRIAN GRATWICKE

[CONSERVATION STATION]

Amphibian Ark

Old shipping containers have new lives as havens for endangered frogs.

One of the most beautiful and biodiverse places on the planet may also represent the last hope for dozens of frog species threatened by a disease wiping out amphibians around the globe. That place is eastern Panama, where the Smithsonian's National Zoo has partnered with eight other organizations to form the Panama Amphibian Rescue and Conservation Project. It aims to save frogs in the midst of the largest extinction event since the age of the dinosaurs.

In its second year now, the project is in a neck-and-neck race with the disease, called chytrid. It's spreading rapidly through cool and moist mountainous regions. The project's researchers are taking grueling expeditions to pristine Panamanian wilderness to capture target species—those most at risk of going extinct at the hands of chytrid.

They bring the frogs back to the Summit National Zoo and the El Valle Amphibian Conservation Center, both in Panama. Because many of these species have never been held in captivity, researchers must learn on the fly how to care for animals that represent the last chance for the survival of their entire species.

"When you are faced with the full magnitude of what is going on in the field, it hits you like a baseball bat," says Brian

Gratwicke, a National Zoo research biologist and the international coordinator for the Panama Amphibian Rescue and Conservation Project. "Chytrid is spreading rapidly; it isn't waiting politely in the background until we can learn everything we'd like to know before bringing these animals in."

Bringing these animals in posed a big problem—space. Facilities in Panama didn't have room for an influx of frogs, and construction takes time and money. The solution: shipping containers, donated by Maersk Line and APL. Project members and volunteers outfitted the containers with all the vitals necessary to care for captive animals—plumbing, electricity, and animal-management tools. That allowed scientists to bring back a greater number of species from the wild.

But it's not just about building an assurance population. If the frogs are ever to return to the wild, the original threat must be mitigated. Although researchers can treat the chytrid-positive frogs that come into captivity, they have yet to discover a realistic solution to stopping the disease in the wild.

Still, project members are determined. They're trekking into Panama's deep wilderness again this summer, gathering new species to save in their improvised arks.

ZOOFARI RESTAURANTS

Looking for a place to eat? Consider patronizing one of the fine restaurants that supported the Zoo by taking part in ZooFari. You can find about a hundred eateries, from Addie's to Zola, at www.fonz.org/zoofarirestaurants.htm. Please be sure to thank them for supporting the Zoo's work.



MEGHAN MURPHY/NZP



MEGHAN MURPHY/NZP

FONZ RESOURCES

www.fonz.org

Membership
Information
202.633.2922

Special Events
202.633.4470

Development Office
202.633.3033

Camps and Classes
202.633.4470

Volunteer Services
202.633.3025

Comments? Questions?

Please email us at
member@fonz.org

Not a FONZ
member yet?

Call 202.633.3034
or go to
www.fonz.org/join.htm

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FONZ CALL FOR BOARD NOMINATIONS

In accordance with our bylaws, the Friends of the National Zoo Board of Directors is now soliciting nominations from the membership for the 2011 FONZ Board. The volunteer Board plays an essential role in shaping FONZ's future direction, and we rely on our members to recommend individuals with the appropriate skills, talents, and leadership abilities to guide our efforts to connect people with wildlife and to support the important work of our partner, the Smithsonian's National Zoological Park.

Please assist us by nominating individuals (or yourself) who would add value to the FONZ Board and who would be interested in this special community service opportunity. Nominations will be reviewed by the FONZ Board Oversight and Nominating Committee, and the names of the selected nominees will be forwarded to the FONZ membership for election consideration.

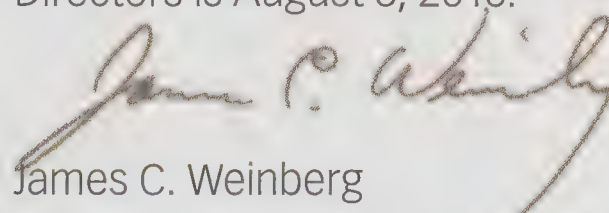
The criteria by which potential candidates are considered include the following:

- Strong interest in supporting zoological education, research, and conservation in accordance with FONZ purposes;
- Fundraising or friendraising ability to help FONZ and the National Zoo achieve their development objectives;
- Demonstrated leadership abilities;

- Demonstrated experience and/or skills that would directly benefit FONZ leadership—both staff and Board—and the FONZ membership;
- Willingness and ability to commit significant time to FONZ's scope of work and FONZ Board activities; and
- A current, dues-paying membership in FONZ.

Much of the FONZ Board's work is accomplished through three standing committees (Executive, Finance and Audit, and Board Oversight and Nominating) and through task forces and other committees. All Board members are expected to serve and fully participate on committees and are expected to attend up to one or more monthly meetings or functions.

Nominations for the FONZ Board of Directors are only accepted from current, dues-paying members, must be submitted on the official FONZ nomination form, and must include a comprehensive biography of the nominee. To receive an official nomination form and/or to discuss Board service with me or a member of the Board, please call 202.633.4379. The deadline for submitting nominations for the 2011 FONZ Board of Directors is August 6, 2010.



James C. Weinberg
President, FONZ Board of Directors

FONZ CLASSES

ADULT/CHILD CLASSES

These programs invite adults and children to discover the Zoo together. All children must be accompanied by an adult. For everyone's safety and enjoyment, unregistered children and siblings may not attend—except for infants who do not yet crawl.

TEDDY BEAR PICNICS

We can bear-ly contain the excitement! You and your favorite stuffed animal are invited to join us for a month where we celebrate bears. Make crafts and play games as we spend time with the Zoo's three kinds of bears: sloth, Andean, and panda! Afterward, gather with your classmates for a teddy bear picnic. (Please bring snacks.) It would just be unbearable if you missed out, so sign up for one or all today!

AGES 2-3

DATES Sept. 5, 12, 19, 26

TIME 10-11:30 a.m.

FEE \$25 per class or \$88 for all four

NOTE Please bring snacks to share at the picnic each week.

Sept. 5: Sloth Bears

Pack your plush pal and take a hike on Asia Trail to visit the sloth bears! But don't you worry: There will be nothing slow about this class!

Sept 12: Andean Bears

Bring your favorite fuzzy friend and come learn about South America's only bear species. Meet the newest members of the Zoo's bear family, our Andean bear cubs. They're sure to be quite a spectacle!

Sept. 19: Giant Pandas

It's panda-monium! Visit Mei Xiang and Tian Tian, the National Zoo's giant pandas. Make black-and-white crafts and learn about these bamboo-eating bears.

Sept. 26: Paging Dr. B. Ear!

Bring your cuddly companion for a bear-y special visit to the Zoo! Give your plush a check-up in the How Do You Zoo? exhibit and learn about the Zoo's veterinarians.



JESSIE COHEN/NZP

CHILDREN'S WEEKEND WORKSHOPS

Parents are not encouraged to stay with the class, but may if they wish (for no charge).

ALICE'S ADVENTURES AT THE NATIONAL ZOO

Fall down the rabbit hole and into a zany world where rats are naked and dragons are real (Komodo dragons, that is)—the National Zoo! Grow curiouser and curiouser as you continue your adventures each week, meeting the creatures of Wonderland.

AGES 4-6

DATES Sept. 4, 11, 18, 25

TIME 10 a.m.-12 p.m.

FEE \$28 per class or \$100 for all four

Sept. 4: Down the Rabbit Hole

We hope you're all ears for the start of this wonderful tale. The story begins with a trip down the rabbit hole. Make bunny crafts before racing to the Kids' Farm to visit the Zoo's (casually dressed) rabbits. Hop to it! You wouldn't want to be late for this very important date!

Sept. 11: Advice From a Caterpillar

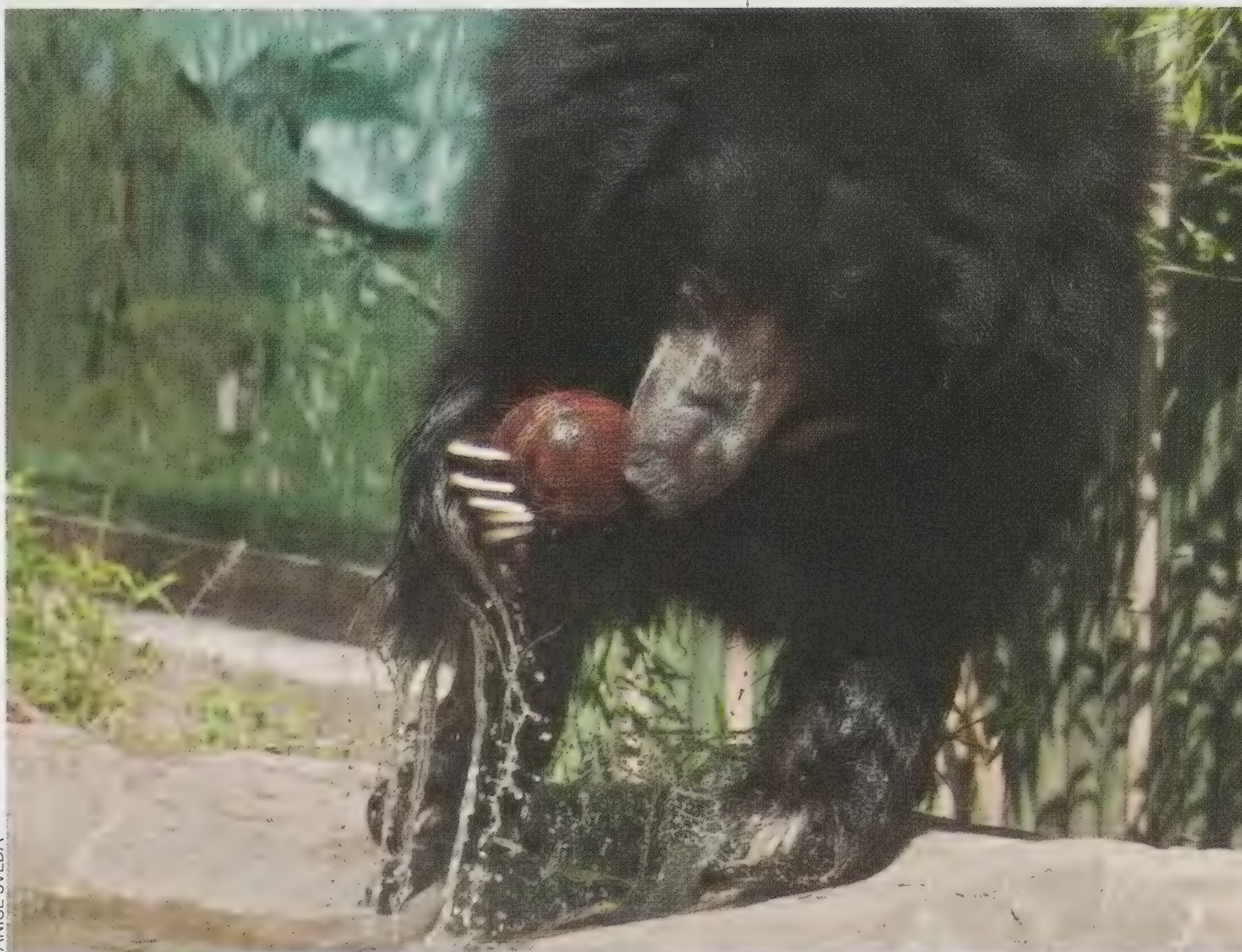
Have a seat and chat a while, as Alice did with the caterpillar! Make fun crafts as you explore the life of this wiggly bug, then spend some time with fluttering butterflies.

Sept. 18: A Mad Tea Party

The Zoo is just mad about cats! Find our wild cats and learn about how they stay hidden in the wild. We're sure everyone will be all smiles at the end of this party! (Please bring a snack to share.)

Sept. 25: The Queen's Croquet Ground

You've been cordially invited to play a game of croquet (Zoo style) with our fantastic flamingos! Learn about these long-legged, regal, pink birds and play some animal-friendly games!



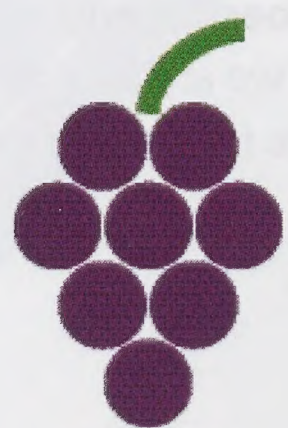
JANICE SVEDA

Register Online at
www.fonz.org/classes.htm

Children's classes and programs are open to FONZ members at the household level or above. Classes meet in the Visitor Center unless otherwise noted.



Swirl, sniff, sip. Repeat.



grapes



apes

Hone your tasting skills and toast wildlife conservation at Grapes with the Apes—the Zoo's annual wine-tasting event. Sample wines from more than 15 vintners, enjoy live music, and learn all about great apes and the Zoo's efforts to protect them. It's an evening full of big flavors sure to provide a smooth finish. Buy tickets today at www.fonz.org/grapes.htm.

GRAPES WITH THE APES

Thursday, September 23

6-9pm at the National Zoo

This event is 21 and over. Rain or shine.

Grapes with the Apes is supported by Asyanut Limited.



RICHARD WEIBLINGER

Elusive Animal

Small and grayish brown, tammar wallabies are easy to overlook in their habitat on Olmsted Walk. Yet FONZ Photo Club member Richard Weiblinger managed to spy and shoot this elusive marsupial. That was no small stroke of luck, since they are, he says, “very fast moving and rarely out in the open.” He was particularly struck by the animal’s “very long and distinctive eyelashes.”

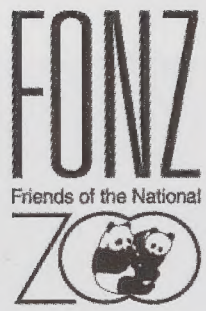
Technical Notes — CAMERA: Nikon D 300 DSLR;
EXPOSURE: 1/320 second at f/11; FOCAL LENGTH: 300 mm

Smithsonian Zoogoer welcomes FONZ members’ submissions of photos taken at the Zoo. Please send photos to **Zoogoer@si.edu**. We will contact you if we are able to use your picture for the Zoo View page.



Good day.

Great day.



Friends of the National Zoo, PO Box 37012, MRC 5516, NW, Washington, DC 20013-7012, www.fonz.org



Smithsonian
National Zoological Park

Set yourself free!

Escape the City at the National Zoo's free summer concert series. Enjoy performances Thursday evenings at 6:30 p.m. on Lion/Tiger Hill. Listen to music ranging from jazz and folk to blues and rock and roll. Bring a picnic or purchase food, ice cream, beer and wine—all while enjoying music as the sun sets.

Schedule

- | | |
|-----------------|--|
| July 22 | The Steve Scott Project
A mix of jazz, reggae, calypso and R&B. |
| July 29 | GHZ [Gigahertz] Band and Show
Psychedelic/blues/classic rock. |
| August 5 | The Grandsons
A mix of New Orleans rhythm and blues, rockabilly, swing and country two-step. |

Find out more at www.fonz.org/sunsetserenades.htm

Sunset Serenades is sponsored by: Booz Allen Hamilton, United Airlines, and Yellowbook